INVASIVE PLANT SPECIES - NOXIOUS WEEDS

Introduction

Invasive plant species are non-native plants that can inhabit and negatively alter native plant communities. A number of invasive species are recognized as noxious, meaning laws have been developed to restrict their spread and effect on the environment. Dry vegetation types and areas affected by road development, grazing, logging, fire, or other disturbances are most susceptible to weed invasion. Typically, invasive species have the ability to spread rapidly and reproduce in high numbers, which enables them to effectively crowd out native plant populations. Some can pose serious threats to the composition, structure, and function of native plant communities.

Differences Between the DEIS and FEIS

This Noxious Weeds section in the FEIS differs from the same section in the DEIS in that analysis for the new Alternative F was included. A new table was added to the Environmental Consequences section that displays, by alternative, the management activities that influence potential risk of noxious weeds. This enables the reader to more easily compare among alternatives.

Information Sources

The Flathead County noxious weed list was consulted, and invasive species of concern were identified (Exhibit P-19). In addition to county listed weeds, a recent weed risk assessment (WRA) project in the Northern Region of the U.S. Forest Service (Mantas 2003) has identified additional species that pose a threat to native vegetation. After assessing the species recognized by Flathead County and the Forest Service, a list was compiled of species of greatest concern regarding impacts on ecosystem integrity for the Logan Creek project area (Exhibit P-19). Weed risk was analyzed for a sample of these species using methods from a weed risk assessment developed for the Northern Region (Mantas 2003).

Analysis Area

The analysis area for evaluating effects from the Logan Creek Project on noxious weeds is the Logan Creek project area. The weed risk assessment also includes a 180-meter buffer around the project area boundary. This analysis area totals 63,834 acres.

Affected Environment

Areas most susceptible to invasion by weeds are areas of severe ground disturbance (e.g., parking lots, gravel pits, roads, skid trails, horse corrals). However, once established on a disturbed site, many weed species can spread onto relatively undisturbed adjacent areas. Non-forested plant communities are also at high risk for invasion by weed species. Most forested communities are less susceptible to invasion and infestation by weed species because of the shade and competition for water and nutrients they provide. However, some invasive species have been successful at invading warm/drier forest types dominated by Douglas-fir and/or ponderosa pine. The warm-dry forest conditions found in 16 percent of the Logan Creek project area make those forest communities more susceptible to invasion, especially if they are disturbed.

Field observations, road surveys, and weed treatment records indicate that the presence and extent of invasive plant populations is expanding within the analysis area. Invasive plant species of concern for the Logan project area are listed below.

Table 3-20. Invasive Plant Species that can become Established or Spread within the Logan Project Area.

Category*	Scientific Name	Common Name	Present in Logan Area
1	*Arctium minus*	common burdock	X
1	*Artemisia absinthium*	common wormwood	X
1	*Centaurea bierbersteinii (C. maculosa)*	spotted knapweed	X
1	*Leucanthemum vulgare (Chr. Leucanthemum)*	oxeye daisy	X
1	*Cirsium arvense*	Canada thistle	X
1	*Cynoglossum officinale*	common hound's-tongue	X
1	*Elymus repens*	quackgrass	X
1	*Hieracium aurantiacum*	orange hawkweed	X
1	*Hypericum perforatum*	St. John's-wort/ goatweed	X
1	*Linaria vulgaris*	yellow toadflax/butter & eggs	X
1	*Potentilla recta*	sulfur cinquefoil	X
1	*Tanacetum vulgare*	common tansy	X
2	*Euphorbia esula*	leafy spurge	
2	*Hieracium caespitosum*	meadow hawkweed complex	X
2	*Linaria dalmatica*	Dalmation toadflax	X
2	*Senecio jacobaea*	tansy ragwort	X
3	*Centaurea diffusa*	diffuse knapweed	
3	*Centaurea solstitalis*	yellow starthistle	
3	*Chondrilla juncea*	rush skeletonweed	
3	*Crupina vugaris*	common crupina	
3	*Isatis tinctora*	dyer's woad	
3	*Lythrum salicaria*	purple loosestrife	
3	*Myriophylum spicatum*	Eurasian water milfoil	

Weed Categories:
Category 1: Widespread invaders = currently widespread on Flathead NF.
Category 2: New invaders = currently present in localized, small occurrences.
Category 3: Potential invaders = currently absent on Flathead NF, but potential habitat exists.

The most abundant and widely distributed noxious weed species in the Logan area is spotted knapweed. This species occurs along portions of many of the roads, gravel pits, and other disturbed sites. Orange hawkweed, meadow hawkweed, and tansy ragwort are of great concern in the area. They are present along many of the roads and in some regenerated harvest units. A control effort for tansy ragwort has been active in and near the Logan Creek area since 1996, after the Little Wolf Fire in 1994. Treatment locations are recorded along most roads, especially in the southern two/thirds of the project area (Exhibit P-17). Other species that are not as abundant, but present throughout the project area are listed in Table 3-20, above.

It is likely that people, vehicles, domestic animals, wildlife, or wind could transport weeds within the analysis area, although distribution alone will not guarantee establishment. Habitat type and disturbance patterns will also greatly influence the establishment of invasive plant populations. However, the potential for each species to establish must be assessed individually because they vary widely in life history, morphology, phenology, ecology, and reproductive biology.

The following paragraphs describe invasion potential for six species that are frequently observed in the Logan Creek drainage.

Canada thistle – Asexual propagation through horizontal root growth represents a major form of reproduction for this species. Although sexual reproduction by seed may not be considered as important as asexual production, it is still considered an important mechanism of survival for this species. Seeds are primarily dispersed through human induced activities although wind and water also have a negligible impact on distribution. Seeds can remain viable in the soil from 2.5 to 22 years depending on how deep they are buried. Canada thistle is typically found in open areas with moderate or medium moisture conditions and is most frequently found along roadsides, railroad rights-of-ways, and on rangeland, forestland, lawns, gardens, cropland, and abandon fields. It is also commonly found in riparian areas.

Common tansy – This is a perennial that reproduces primarily from seed and also from a rootstalk. It is a prolific seed producer whose seeds are wind and snow dispersed. It is typically found growing along roadsides, waste areas, stream banks, and pastures.

Oxeye daisy – It reproduces vegetatively along a rhizome and is a prolific seed producer. It occurs in meadows, native grasslands, pastures seeded to introduce species, waste grounds, and along railway embankments and roadsides. It is not likely to invade forested areas because it has a low tolerance to shade. Cattle grazing tends to encourage its spread because they avoid this plant. Because oxeye daisy is a showy plant, landowners often are reluctant to control its spread.

Spotted knapweed - A perennial that lives up to nine years and is capable of producing seeds each year. Seeds are distributed by wind, vehicles, or animals and can be transported over long distances. More seeds are produced during wet years. This species is most aggressive in the forest-grassland interface and is commonly seen growing along roadsides. An allelopathic compound has been isolated from spotted knapweed and can reduce germination rates of native grasses.

Tansy ragwort - This is usually a biennial or occasionally a short-lived perennial. Plants produce many seeds that are locally distributed by wind or over longer distances by animals. Seeds can remain viable in the soil from 4 to 16 years depending on what depth they are buried. This species can also establish by vegetative buds. Although it has been more troublesome in the Pacific Northwest, it is becoming an increasing problem in Montana. Disturbances to native plant communities such as logging, road construction, and overgrazing provide potential habitat for this species. Open areas and south facing slopes are most vulnerable to invasion by tansy ragwort.

Yellow toadflax – This is a deep-rooted, short-lived perennial that reproduces by seeds and vegetative buds on the roots. Seeds produced per capsule are variable, but typically not extreme. Although wind had been considered a major means of seed dispersal, current information has determined that very few seeds land more than five feet from the parent plant. This weed can adapt to a wide variety of conditions, but is typically associated with disturbed open habitats (e.g., spring-grazed pastures, sagebrush flats) or developed sites (e.g., roadsides, vacant lots, and gravel pits). Wet or dark conditions can limit its establishment.

Control and Containment

Efforts to control the spread of noxious weeds include prevention, containment, and eradication methods. Eradication is generally limited to localized areas and category 2 and 3 species. Methods used for eradication include hand pulling and herbicide applications. Containment methods are used to prevent weeds from spreading into new areas and reducing the coverage, if possible, in existing infestations. Containment methods include closing infested areas to travel, washing vehicles and equipment upon entering or leaving an infested area, using weed free seed and straw mulch for revegetation, hand pulling, and herbicide application around the perimeter of the infestation. Prevention uses similar techniques as containment, with the objective of preventing a new weed infestation rather than limiting spread of an existing one. Biological control agents (seed, leaf, and root feeding insects) have had some success in controlling noxious weeds in Montana. Biological control agents are being used to help control tansy ragwort on the Tally Lake Ranger District.

REGULATORY FRAMEWORK

Management direction for noxious and invasive weed control on the Flathead National Forest is set at the national and forest levels. Forest Service policies were developed in response to federal laws guiding implementation of noxious weed control actions. The Flathead National Forest Noxious and Invasive Weed Control Environmental Assessment (March 2001) and Decision Notice (May 2001) were designed to meet legal requirements and Forest Service policies for noxious weed control.

Environmental Consequences

No significant issues related to invasive plants were identified for this project. The following indicators were used to evaluate environmental effects on noxious weeds:

- Relative rating of vulnerability to weed spread (1=highest, 5=lowest) by activity by alternative
- Percent of area at risk from infestation/invasion of selected weeds in the Logan project area.

Direct and Indirect Effects

To compare the five alternatives, the table below displays a relative rating of ground disturbance anticipated by each alternative; 1 indicates the most impacts and 6 the least. Ground disturbance is used as a measure of vulnerability of a site to weed invasion. Miles of open roads is used to indicate the opportunity for weed spread that contributes to the probability of exposure of a site to weed invasion. The overall ranking is ranking of the simple average of all activities by alternative.

Table 3-21. Relative rating of vulnerability to weed spread (1-highest, 5-lowest) by ground-disturbing activity by alternative.

Activity proposed	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Prescribed burning	2	1	1	1	1	1
Timber harvest	6	1	5	4	2	3
Temporary road construction	6	1	5	4	2	3
System road construction	5	2	4	4	1	3
Road rehabilitation	6	1	5	4	2	3
Road reclamation	3	2	2	2	1	1
Open roads (yearlong)	3	1	1	1	2	2
Open roads (seasonally)	1	1	2	1	1	1
Overall ranking	6	1	5	4	2	3

Weed Risk Assessment

In addition to rating the general effects from weeds, a weed risk assessment was conducted in order to describe the risk to native plant communities by individual weed species. The area was evaluated using methods from an ongoing weed risk assessment project being conducted for the Northern Region of the Forest Service (Mantas 2003). The model in the assessment determines risk using a combination of the following factors: susceptibility of a plant community to a weed species; the threat to that plant community from the species; and the probability of exposure of the area to that species (susceptibility, threat, exposure, and risk are defined in Mantas 2003). A more detailed description of the methods used in conducting this

weed risk assessment for the Logan Creek weed analysis area can be found in Exhibit P-18. Products generated from this assessment are maps with associated acreage calculations (Exhibit P-20). Table 3-22 displays the risk level in percent of total area from 11 individual weed species. Weed species analyzed were a subset of all species that could become invasive in the project area. Not all invaders were analyzed. For some there is insufficient data, and others were not considered a threat to the habitats in the Logan Creek area. The 11 species analyzed provide a good representation of the overall risk from weeds because these species span the range of ecological requirements provided in the Logan Creek project area and they represent species from each category (1, 2, and 3).

The risk assessment was first conducted under current conditions, and then these figures were used as the baseline from which to compare the action alternatives. This baseline is considered the same as the no-action alternative (Alternative A).

To compare the baseline condition against the action alternatives, weed risk was recalculated for each action alternative after all acreage in the proposed units was recoded as disturbed. The weed risk assessment model does not allow for analysis by varying degrees of disturbance. Therefore, all acreage within proposed harvest units was considered disturbed, even though every acre would not be affected and each logging system and amount of retention would have different degrees of ground impacts. Therefore, this analysis tends to overestimate the acres at risk. Regardless, what is important is the comparison among alternatives. The results of the weed risk assessment are displayed as percentages of the project area in Table 3-22, discussed by alternative below, and displayed in maps in Exhibit P-21.

Tansy Ragwort - Tansy ragwort (*Senecio jacobaea*) was not analyzed in the weed risk assessment due to a lack of data needed to model risk. This species is worth mentioning, however, due to many concerns raised about its potential to spread after wildland fire as evidenced in the Little Wolf Fire of 1994, just west of the Logan Creek project area. The Logan Creek project area contains many small occurrences of tansy ragwort that have spread from the Little Wolf Fire area. There is also an added concern as this species is new to Montana, and currently only known in the northwest corner of the state. Although risk was not modeled, this species has been observed to behave similarly as common toadflax and common tansy with regard to susceptibility of the habitat types in the area and threats to these types. Therefore, the percent of the area at risk from tansy ragwort would be similar to those found in Tables 3-35 for common toadflax and common tansy.

Direct and Indirect Effects Common to the Action Alternatives

Vegetation treatments, road closures, road decommissioning, temporary and system road construction, road rehabilitation, and fuel reduction are proposed in all action alternatives. The differences in the effect on weeds by alternative are the degree to which these actions occur. Therefore, common to all alternatives is in general the effect that these activities have on weed risk and spread. These general effects are discussed below by activity.

Timber Harvest and Other Vegetation Treatments

The effects of logging are variable depending on the amount of ground disturbed during the activity; the more bare soil exposed, the more germination substrate is available for colonizing weed seeds. Ground-based systems with wheeled machinery usually disturb more ground than do skyline cable systems. Areas used for landings with any logging system can be highly impacted. The amount of area disturbed may vary by the type of retention prescription planned. With heavy retention, less volume would be removed, more canopy (shade) would remain, and less soil would be disturbed than with light retention.

Table 3-22. Percent of area at risk from invasion of selected weeds in the Logan Project area.

	Percent of area at risk (total analysis area = 63,834 acres)	Risk Level	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Category 1 (widespread invaders)	spotted knapweed	High	2%	2%	2%	2%	2%	2%
	goatweed	Low	39%	49%	47%	47%	49%	48%
	sulfer cinquefoil	No risk	59%	49%	51%	51%	49%	50%
	Canada thistle	High	0%	0%	0%	0%	0%	0%
	common tansy	Low	39%	49%	47%	47%	49%	48%
	yellow toadflax	No risk	61%	51%	53%	53%	51%	50%
	orange hawkweed	High	33%	40%	38%	38%	40%	39%
		Low	6%	9%	9%	9%	9%	9%
		No risk	61%	51%	53%	53%	51%	52%
		Unknown	0%	0%	0%	0%	0%	0%
Category 2 (new invaders)	meadow hawkweed	High	33%	40%	38%	38%	40%	39%
		Low	0%	2%	2%	2%	2%	2%
		No risk	59%	49%	51%	51%	49%	50%
		Unknown	8%	9%	9%	9%	9%	9%
	Dalmation toadflax	High	2%	2%	2%	2%	2%	2%
		Low	7%	10%	10%	10%	10%	10%
		No risk	91%	88%	88%	88%	88%	88%
		Unknown	0%	0%	0%	0%	0%	0%
Category 3 (potential invaders)	yellow starthistle	High	0%	0%	0%	0%	0%	0%
		Low	0%	2%	2%	2%	2%	2%
		Moderate	2%	2%	2%	2%	2%	2%
		No risk	98%	96%	96%	96%	96%	96%
	rush skeletonweed	High	0%	0%	0%	0%	0%	0%
		Low	39%	49%	47%	47%	49%	48%
		No risk	60%	50%	52%	52%	50%	51%
		Unknown	0%	0%	0%	0%	0%	0%

Another consideration is the time of year that vegetation treatments would occur. Harvest and skidding logs on snow-free ground would disturb more soil than if done over frozen ground or

compacted snow. Winter logging is not a feature of any action alternative; however, logging on frozen ground or compacted snow may occur if requested by the timber sale purchaser.

Machinery can spread weed seeds if not washed before use. Therefore, project design features include cleaning all off-road equipment before entering the area. Use of dedicated skid trails would also minimize weed spread across units. Other features designed to minimize soil impacts (see Chapter 2) would aid in reducing noxious weed spread also.

Prescribed burning would reduce shade and competing vegetation and expose some bare mineral soil to create a favorable environment for noxious weeds. With the proximity of tansy ragwort and very large, dense populations of hawkweeds developing in the nearby Little Wolf Fire area, burning may increase the risk of weed infestation. Approximately one-half of the area proposed for burning is at a low to moderate risk of infestation because they are in warm potential vegetation groups or have a prescription of light retention or heavy aggregated retention that would result in forest openings.

Road Reclamation and Temporary Road Construction

These activities would expose bare soil and parent material, creating suitable substrates for weed germination. Proposed weed control actions, revegetation, and closing these roads to vehicular use would lessen the impacts from weeds (see Chapter 2).

System Road Construction, Road Rehabilitation, and Trail Construction

These activities also would expose bare soil and parent material, creating suitable substrates for weed germination. Proposed weed control actions and revegetation would lessen the impacts from weeds (see Chapter 2).

Road Closures

Use of roads facilitates weed establishment because roads serve as travel routes for the main vectors of weed spread. These specifically include cars and trucks, along with mountain bikes and horses. Closing roads reduces the ability for weed seeds to spread.

Direct and Indirect Effects of Specific Alternatives

The alternatives differ in proposed management activities that influence potential risk of noxious weeds. The following Table 3-23 summarizes these relevant management activities for each of the alternatives:

Table 3-23. Management Activities that Influence Potential Risk of Noxious Weeds, by Alternative.

Management Activity	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Vegetation management (acres)	0	6624	4235	4724	6315	5521
New road construction (miles)	0	9.8	6.3	7.0	9.6	8.3
Currently open roads that will be closed by gates or reclamation (miles)	0	6.9	6.9	6.9	7.5	7.5
Weed risk ranking (1=highest risk of spread; 5=lowest risk) (see narrative explanations below)	5	1	4	4	2	3

Alternative A (The No-Action Alternative) would involve the least amount of ground disturbance and would provide the least amount of new habitat for weeds; therefore, its implementation would create the least risk of infestation (Table 3-21). However, this alternative has the most miles of existing open road that can contribute to weed spread. With no management actions and in the absence of control efforts, those species that are capable of spreading without disturbance, such as orange hawkweed, would continue to spread and sources of infestation would exacerbate the process.

The summary of percent of area at risk by alternative is in Table 3-22. The level of current risk varies among species analyzed. As an example of how a reader should evaluate the data presented in this table, consider yellow starthistle, a potential invader (category 3) that is not yet known in western Montana. The table indicates that it poses no risk over 98 percent of the project area and none of the area is at high risk. Dalmation toadflax, a new invader to western Montana that is not known in the Logan Creek area (category 2), poses no risk over 91 percent and high risk over only 2 percent of the project area. These predictions are reasonable because these species prefer drier vegetation types than most that dominate the Logan Creek area. Species with a high percentage (greater than 30 percent) of the area at low risk and a low (less than 2 percent) percentage of area at high risk include spotted knapweed, goatweed, sulfer cinquefoil, Canada thistle, common tansy, yellow toadflax, and rush skeletonweed. With the exception of rush skeletonweed (category 3), these are all widespread invaders (category 1). These predictions reinforce observations that these species are common along roads in the Logan Creek area, but do not become well-established under the tree cover of undisturbed forested areas. Conversely, the risk from orange and meadow hawkweed is great, with 33 percent of the area at high risk. These species prefer the cool moist environments that are found in over 64 percent of the project area.

Alternative B. Implementation of Alternative B would involve the most ground disturbance and new habitat for weeds of all the alternatives, and therefore has the highest weed risk ranking (Table 3-23, above). With implementation of Alternative B, the following notable changes in risk would likely occur for the following noxious weed species:

- Orange and meadow hawkweeds: approximately 7 percent more of the analysis area would be at *high risk* for these species than at the present time.

- Yellow starthistle and dalmation toadflax: approximately 2 percent more of the analysis area would be at *low risk* for these species than at the present time.
- Spotted knapweed, goatweed, sulphur cinquefoil, Canada thistle, common tansy, yellow toadflax, rush skeletonweed: approximately 10 percent of the analysis area would change from *no risk* to *low risk* for these species.

Alternative C. Implementation of Alternative C would involve the least amount of ground disturbance of any of the alternatives, and therefore has the lowest risk rating—along with Alternative D—of all the alternatives (Table 3-23). With implementation of Alternative C, the following notable changes in risk would likely occur for the following noxious weed species:

- Orange and meadow hawkweeds: approximately 5 percent more of the analysis area would be at *high risk* for these species than at the present time.
- Yellow starthistle and dalmation toadflax: approximately 2 percent more of the analysis area would be at *low risk* for these species than at the present time.
- Spotted knapweed, goatweed, sulphur cinquefoil, Canada thistle, common tansy, yellow toadflax, rush skeletonweed: approximately 8 percent of the analysis area would change from *no risk* to *low risk* for these species

Alternative D. Implementation of Alternative D would involve the a moderate amount of amount of ground disturbance (between that of Alternative B and Alternative C), but the vegetation management prescriptions would retain more trees in harvest units than Alternative C. Also, Alternative D would involve fewer miles of road construction and road rehabilittion than Alternative C. Therefore, Alternatives C and D share the lowest overall weed rating risk (Table 3-23). With implementation of Alternative D, the following notable changes in risk would likely occur for the following noxious weed species:

- Orange and meadow hawkweeds: approximately 5 percent more of the analysis area would be at *high risk* for these species than at the present time.
- Yellow starthistle and dalmation toadflax: approximately 2 percent more of the analysis area would be at *low risk* for these species than at the present time.
- Spotted knapweed, goatweed, sulphur cinquefoil, Canada thistle, common tansy, yellow toadflax, rush skeletonweed: approximately 8 percent of the analysis area would change from *no risk* to *low risk* for these species

Alternative E. Implementation of Alternative E would involve slightly fewer acres of ground disturbance and slightly fewer miles of road construction than Alternative B, and the vegetation management prescriptions would retain more trees in harvest units than Alternative B. Also, Alternative E would close 0.6 more miles of currently open road than Alternative B. Therefore, Alternative E has a lower risk rating than Alternative B, but not as low as Alternatives C and D (Table 3-23). With implementation of Alternative E, the following notable changes in risk would likely occur for the following noxious weed species:

- Orange and meadow hawkweeds: approximately 7 percent more of the analysis area would be at *high risk* for these species than at the present time.

- Yellow starthistle and dalmation toadflax: approximately 2 percent more of the analysis area would be at *low risk* for these species than at the present time.
- Spotted knapweed, goatweed, sulphur cinquefoil, Canada thistle, common tansy, yellow toadflax, rush skeletonweed: approximately 10 percent of the analysis area would change from *no risk* to *low risk* for these species.

Alternative F (Preferred Alternative). Implementation of Alternative F would involve approximately 1,100 fewer acres of ground disturbance and 1.5 fewer miles of road construction than Alternative B, and the vegetation management prescriptions would retain more trees in harvest units than Alternative B. Also, Alternative F would close 0.6 more miles of currently open road than Alternative B. Therefore, Alternative F has a lower risk rating than Alternative B, but not as low as Alternatives C and D (Table 3-23). With implementation of Alternative F, the following notable changes in risk would likely occur for the following noxious weed species:

- Orange and meadow hawkweeds: approximately 6 percent more of the analysis area would be at *high risk* for these species than at the present time.
- Yellow starthistle: approximately 2 percent more of the analysis area would be at *low risk* for these species than at the present time.
- Spotted knapweed, goatweed, sulphur cinquefoil: approximately 2 percent of the analysis area would change from *no risk* to *low risk* for these species.

Cumulative Effects of Alternative A (No-Action)

Alternative A defines the conditions under no action, which is the existing condition. There would be no change to the above-described cumulative effects of weed spread and invasion if no action were taken.

Cumulative Effects Common to All Action Alternatives

Each alternative would contribute to cumulative effects to the degree described in detail in the direct effects section above. The range of acres affected from proposed vegetation treatments in the alternatives is from 4801 to 7190. Some of these acres are already considered "disturbed" or "exposed" with regard to weed susceptibility due to past harvesting, extensive road systems, and the proximity of tansy ragwort and orange hawkweed infestations (Little Wolf fire area). Therefore, the difference among the proposed actions in how they contribute to cumulative effects is minimal, so all action alternatives are analyzed together.

In summary, many past, present, and foreseeable actions have and will contribute to weed risk and spread in the Logan Creek project area. Approximately 4000 to 6500 additional acres would become more susceptible to weed invasion from a number of weed species because of this action. However, the contribution to cumulative effects would be reduced by design features and ongoing activities that would lessen the impact of weed spread. Specifically, these activities are aggressive weed treatments, soil stabilization measures, revegetation of disturbed sites, and road closures. Alternative B would contribute the most to the risk of weed establishment due to the higher miles of road construction and harvest acres. Alternative

C and D would contribute the least to weed establishment. Alternative F would contribute less risk to weed establishment than B, but more than Alternatives C and D.

REGULATORY CONSISTENCY

All Logan Creek alternatives incorporate and are consistent with the Flathead National Forest Noxious and Invasive Weed Control Decision Notice. Treatment and monitoring of known weed populations in the Logan Creek project area would be implemented under the authority and guidance of this decision.